DOCUMENT RESUME

ED 247 746 FL 014 467

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TITLE The Effects of a Structured Immersion Approach to Minority Language Asian Students: Results of a Longitudinal Evaluation.
PUB DATE Apr 84
NOTE 27p.; Paper presented at the Annual Meeting of the American Educational Research Association (68th, New Orleans, April 23-27, 1984).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Asian Americans; *Bilingual Education Programs; Elementary Education; *English (Second Language); *Immersion Programs; Longitudinal Studies; Minority Groups; Program Design; *Program Effectiveness; Program Evaluation; *Second Language Instruction; Sequential Learning

ABSTRACT

The evolution and evaluation of an elementary level structured immersion program in English as a second language are described. The program provides all academic instruction in English, but at a level that students can understand. It is ungraded, uses bilingual teachers who speak the students' native language, and has both developmental and direct instructional components. Vocabulary is carefully controlled and lessons are carefully sequenced to build on students' existing knowledge and proficiency. Evaluation of the program was undertaken through administration of the Comprehensive Test of Basic Skills, with the Language Assessment Scale as a supplemental measure of language skills. Two analyses were performed. In one, the performance gains of children in grades 3-6 were found to be significant in almost all academic areas tested. In the second, performance gains of non-English-speaking and limited-English-speaking children at the end of grade 2 and enrolled in the program for at least two years were compared with children not enrolled but within the same school district. Students in the program achieved and maintained above-median performance in all areas. It is concluded that structured immersion programs can be effective and warrant further consideration. (MSE)

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The Effects of a Structured Immersion Approach to Minority Language Asian Students: Results of a Longitudinal Evaluation

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Russell Gersten

University of Oregon

Paper presented at annual meeting of American Educational Research Association; April, 1984. New Orleans, Louisiana.

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A recent, comprehensive review of studies evaluating the effectiveness of bilingual education by Baker and deKanter (1983) of the U.S. Department of Education, concluded that "although there are few American examples of structured immersion, these programs seem to generally succeed quite well in both the second language and subject areas" (p. 11). They cite several studies demonstrating that language minority students, receiving a structured immersion approach, often make outstanding progress in the second language and in mathematics (Lambert & Tucker, 1972; Barik et al., 1977; Ramos et al., 1967). They conclude that a structured immersion approach may well be beneficial for language minority students in the U.S., and may be superior to the transitional bilingual model used in most programs of the country. By structured immersion the authors refer to programs conducted in the second language, but with "a curriculum...structured so that (all) communication is at a level the child can understand" (p. 11). They differentiate structured immersion from submersion, where instruction is conducted in English, regardless of whether or not the children can understand what the teacher or the fellow students are saying.

One of the more difficult problems in implementing a structured immersion program is how to systematically introduce English in a controlled and efficient manner so that students can follow the teacher throughout the lesson. One viable option would appear to be the educational model commonly called direct instruction. With this model, instructional programs are developed so that each step in acquiring a new skill or concept (i.e., all prerequisite skills) is clearly specified and taught. All skills are broken down into small steps. The language of instruction is clear and consistent, using a carefully controlled vocabulary. Lessons call for frequent assessment of student progress with specific procedures for immediately correcting student errors. (See Becker, Engelmann, Carnine,

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& Rhine, 1981; Gersten, Carnine, & White, 1984; or Rosenshine, 1983, for further details on the model.)

There is evidence this model is effective in teaching economically disadvantaged and/or low performing students (Becker, 1977; Stebbins et al., 1977; Rosenshine, 1983), including those entering school with limited English backgrounds (Gersten, 1981a, b; Gersten, Carnine, & Williams, 1982). Because of the careful sequencing of preskills, the controlled vocabulary, and its system for consistently assessing whether students comprehend the material, direct instruction would seem to offer a workable basis for establishing a structured immersion program for limited and non-English speaking students. This paper describes such a program, how it evolved over the past decade, how it currently operates, and its impact on the students involved.

Evolution of the Intervention

In 1969, there were no non-English or minority children at a school on the West coast, which will be called Lockwood School. There were, however, many low income, low performing students at this school. A direct instruction program in basic skills was instituted, similar to the one used in Project Follow Through.

In 1970, four non-English speaking first graders entered the program. Since there was no formal English as a Second Language (ESL) program, these children were taught using the Direct Instruction programs in language and reading. This appeared to be a successful approach, so all new ESL students in the primary grades were included in the Direct Instruction programs.

At that time the few 4th-6th grade limited English proficient students at Lockwood School were not taught English language reading at all for their

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first three to five months of school. In the meantime, their younger siblings in the primary grades were being instructed in Distar Reading and Language from the first day of school. By the end of the year, the primary grade students were reading in English, and beginning to speak English with some fluency, often surpassing their older siblings in English language and reading skills.

Beginning in 1979, an ungraded model was developed for ESL students in kindergarten through sixth grade. A combination program was designed using both the developmental Distar programs, including the newly developed remedial direct instruction programs in oral reading and reading comprehension, the Corrective Reading Programs (Engelmann et al., 1978 a, b, c, d).

Major Components of the DILE Program

Structured English immersion. Language acquisition is, in many ways, fundamentally different than acquisition of basic academic skills. Yet we contend that the more a child practices new language skills throughout the day, the more quickly he or she will master the language. However, as in most areas of education, mere practice is not enough. The key to a structured immersion is that all academic instruction takes place in English, but at a level understood by the student (Baker & Dekanter, 1983). Though virtually all instruction is conducted in English, there are always bilingual instructors in the class who understand the child's native language, and translate problematic words into the child's native language, to answer questions phrased in the native language, to help the child understand classroom routines, to show him or her where the bathroom, lunchroom, and playground, etc. The carefully controlled vocabulary and the carefully sequenced lessons in the Direct Instruction programs allow teachers to "preteach" any new words that come up in the math, reading, or language lessons. The curriculum programs are

structured so that prior knowledge of English is not assumed. New material and concepts are explained so that they can be understood by the students. Both LEP and English speaking students are in the learning complex. Thus, LEP students are provided with English speaking role models.

Teaching the structure of the English language. Beginning students with no English language skills, regardless of grade level, receive two language lessons a day. We found that the Asian children in this program would "pick up" nouns for everyday objects fairly easily from their peers. However, they needed intensive instruction in how sentences are developed and spoken in English, since the syntax of English is totally different in Korean, Japanese, or Vietnamese. The Distar Language and Corrective Reading Programs emphasize the structure of the English language--tense, plurals, appropriate use of adjectives and prepositions, along with selected logical and analytical skills such as classification skills and analogies.

Use of developmental and remedial programs for ESL students. In its intermediate grade (3-6) program, the DILE model combines developmental materials with remedial programs. There are several reasons for this combination. The older Asian students need the intensive work on language production and receptive language provided by the beginning language program, but needed the more sophisticated content of the remedial reading programs (geared for 9 to 17 year olds). In math, the remedial/developmental distinction appeared less important to us because the language demands of the series are greatly reduced, and the issue of "childish" content was not terribly important.

Non-graded, mainstreamed approach. Rather than isolate the limited English students by placing them in a separate ESL classroom, they are mainstreamed into a learning environment where they encounter English

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speaking children working at many skill levels. Students are placed in instructional groups in language, reading, and math based on their current skill level, rather than age. Thus, a fourth grader may be in a beginning (first grade level) English oral language program, a first grade reading program, and a fourth grade math program. These student "groupings" are temporary; as skills develop, students are moved as rapidly as possible through the academic sequences. Often students enter a regular classroom within two years.

Use of bilingual aides as instructors. The paraprofessional aides serve two major purposes in the program. They are trained (by the head teachers) to teach daily lessons to small groups of children in the Reading and Arithmetic programs. Essentially, they serve as additional teachers, allowing for small group instruction in all academic areas. In addition, the bilingual aides help the non-English speaking students adjust to the environment, occasionally serving as translators during a child's first few months.

Evaluation Methodology

Measures

The measure of achievement used in this evaluation was the Comprehensive Test of Basic Skills (CTBS), Form S, 1973 edition. The reliability, norming procedures, and validity of the CTBS as a measure of academic achievement is generally considered satisfactory for the purposes of program evaluation (Buros, 1978).

The Language Assessment Scale or LAS (DeAvila & Duncan, 1977) was used as a supplemental measure. It was used to describe the entering English language capabilities of the DILE students. In the evaluation of the primary

grade students, the LAS was used to determine whether the DILE and comparison samples were equivalent in English language proficiency.

The Language Assessment Scale (LAS) provides an overall picture of a child's oral language proficiency in English. Scores on the LAS range from 1 to 5. 1 and 2 mean non-English speaking; 2 is limited fluency; 4 is near fluent; and 5 is fluent in English. The test assesses all four systems of language--phonemic, referential, syntactic, and pragmatic (the ability to use language to express needs or obtain goals). Reported reliability (internal consistency) indices range from .89 to .96 for a sample of 295 children. Inter-rater agreement coefficients range from .87 to .96.

Testing Procedures

All DILE students at all grade levels were tested on a level of the CTBS, Form S. (The appropriate instructional level was determined by the teacher.) In each case, students took a level of the test for which there were empirical norms (e.g., no fourth grader took Level B). These scores served as post test scores in the evaluation. Students' scores from the previous spring served as their pretest scores. The student's raw score was converted to normal curve equivalents (NCEs). (Raw scores were also converted to grade equivalent scores for primary grade students.)

Since the instructional programs testing procedures and evaluation design are different for the primary (first and second) grade students and the remaining (third through sixth grade) students, separate analyses and claims of effectiveness are made for each group. However, the reader is reminded that all instruction took place in a non-graded setting. Students were placed in instructional groups on the basis of current skill level, not age or grade level.

Results

Intermediate (Third through Sixth) Grades: Norm Referenced Design

Data were analyzed using the norm-referenced model (Tallmadge, 1977). Because of the skewed distributions and small sample sizes, both a parametric (correlated t-test) and a non-parametric statistic (the Wilcoxon Sign-Rank test) were used to analyze the results. These analyses were performed for grades 3 through 6 together. (The use of NCE's allows for this.)

Subjects. The ethnic composition of each sample is described in Table 1.

Insert Table 1 here

Results. Table 2 presents the descriptive statistics and the statis-

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Insert Table 2 here

tical analyses. All calculations were performed on NCE scores.

Significant improvement was found in all domains for the 1980-81 sample. The results of the correlated t-tests (with 14 degrees of freedom) were as follows: 6.0 for Reading, 5.3 for Language, 6.5 for Math. All were significant at the .05 level. Using the non-parametric Wilcoxon sign-rank test (Marascuilo & McSweeney, 1977), all results were significant at the .05 level. Results were T = 110 for Reading, T = 113 for Language, T = 116 for Math.

For the 1981-82 students, gains in all three domains were significant. Significant growth was found in Reading and Language, but not Math. The magnitude of the gains for the intermediate grade students were .91 SD units in Reading for 80-81 and .97 for 81-82. They were 1.51 and 1.02 in Language, and 1.55 and .39 in Math. This exceeds commonly set criteria for educational significance (Tallmadge, 1977).

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Primary Grades (First and Second Grade): Comparison Group Design

Overview of the Evaluation. The end-of-second grade performance of two cohorts of non-English speaking (NES) and limited-English speaking (LES) students in the DILE program for all of first and second grade was compared to that of comparable NES/LES students involved in the district's bilingual program. Comparability was determined by students' entry LAS scores (a measure of English language proficiency) and ethnicity. Two cohorts of students were involved in the study. Cohort I began first grade in the fall of 1978 and finished second grade in the spring of 1980. Cohort II began in fall 1979, and finished in spring of 1981.

Testing Procedures for Primary Grade Students. As previously mentioned, all DILE students were tested each spring on a level of the CTBS which, in the teacher's opinion, matched the child's instructional level, and for which there were empirical norms. The district's bilingual program used a different testing policy. Teachers were not required to test all ESL students, only those students who, they felt, were reading at or above grade level. Furthermore, if a student was tested and his or her scores were below grade level, the teacher or principal could choose not to report the scores. A few teachers did test all students; but most either did not test--or did not report-scores of ESL students who were below grade level. If a child was not tested at all, his/her name did not appear on the district computer file. Since all DILE students were tested, and generally only the highest achieving ESL students in the traditional program were tested, any comparisons between the DILE students and children in the control group represent a conservative estimate of the effects of DILE.

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Selection of the Comparison Group

To be eligible for the study sample, students were required to attend DILE or the district bilingual classes for two full years. Since the ESL population in Monterey is highly mobile, a large number of DILE and comparison students were ineligible, since their length of stay was less than two years. The comparison group was selected from the district's central computer file. The comparison group for cohort I was selected from the file by recording the information of all ESL students who entered first grade in September-October 31, 1978. The comparison group for cohort II was selected from all students entering in September-October, 1979. The file recorded each child's ethnicity, date of birth, entry LAS score, and her/his scores on the CTBS at the end of the school year. However, if a comparison child's score was lower than the national median (e.g., lower than a G.E. of 2.8 at the end of second grade), and the teacher or principal wished to include him/her in the district's file, the computer merely recorded a symbol to indicate "child was tested, but score was below grade level."

The mean entry LAS scores for cohort I DILE and comparison were nearly identical (2.7 for DILE and 2.6 for comparison). In both cases, all students were Asian. In the case of cohort II, the mean LAS score for the comparison sample was 2.18 for DILE, 2.28 for bilingual. Table 3 presents the ethnic distribution for cohort II.

Insert Table 3 here

Strategy for data analysis

Because only grade equivalent scores were reported for comparison students, and for some students, the file only reported "below grade level," the analyses could only examine whether, by the end of second grade, a

the national median than comparable students in the district's bilingual program. Thus, results were analyzed using the chi-square statistic. This hypothesis was evaluated for two cohorts of students--cohort I (1978-4 1980) and cohort II (1979-1981).

Results: Comparison of DILE and District Program. Table 4 presents the number and percent of DILE students and students in the district bilingual program performing (a) at or above grade level, and (b) below grade level on Total Reading and Total Math on the CTBS. Data are presented for cohort I, cohort II, and the aggregated samples (i.e., cohort I and cohort II pooled together).

Chi-squares were performed on the aggregated sample only (since sample sizes were too small for either cohort). Results indicated significant differences in Reading ($\chi^2 = 11.70$, $p < .001$), and Math ($\chi^2 = 8.89$, $p < .005$). The results in Language were not significant; $\chi^2 = 2.31$. There is evidence that a significantly greater proportion of DILE students perform at or above the national median in Reading and Math than students in the district's bilingual program. Seventy-five percent of the students were at or above grade level Reading, and 96 percent in Math. For the students in the traditional bilingual program, seventy-five percent of the students were at or above grade level in Reading, and 96 percent in Math. For the students in the traditional bilingual program, only 19 percent were at or above grade level in Reading; 62 percent were above grade level in Math.

Mean score for DILE students in Reading corresponded to the 64th percentile for cohort I and the 65th for cohort II. In Language, the percentiles were 72 and 64, in Math 80 and 88. In each case, the mean performance of the DILE students exceeded the national median. The reader is reminded that the CTBs tests only written language, not oral language.

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Maintenance of Effects. Table 5 presents achievement data for all DILE students from cohort I who are still in Marina Del Mar School. Virtually all these students are now in regular classrooms in the school. The mean NCEs and percentile equivalents are presented for end of second grade (May, 1980), end of third (May, 1981) and end of fourth (May, 1982).

Data were analyzed using a repeated measures Anova (for cohort I), and a paired t-test (for cohort II).

For cohort I, there were no significant differences between second and third grade performance in Reading and Language. The descriptive statistics demonstrate that student performance was essentially stable--from the 63rd to 64th percentile in Reading, and 71st to 75th percentile in Language. There was a significant drop in Math: from the 84th to 65th percentile; However, students are still well over the national median at the end of third grade, at the 67th percentile. These above average results are maintained during the fourth grade. None of the fluctuations from third to fourth grade were significant. Two years after the students leave the DILE program, they are performing well above the national median, at approximately the same level as when they left the program in 1980.

No significant differences between second and third grade were found for cohort II. Again, mean student performance was essentially maintained at levels above the national median.

Effects on the English-Speaking Students Who Participate

Table 6 presents the end-of-second grade data for the 10 English-speaking Anglo students in cohort II. These English-speaking students are all performing well above the national median, and above the median level for the Monterey Unified School district (which is between the 60th and 70th percentiles). Though the absence of a control group precludes drawing any strong

inferences from these data, it appears the DILE experience was not harmful to these students academically, and may have offered them some real cultural benefits.

Discussion

With the recent change in Federal regulations concerning bilingual education, there has been increased interest in structured immersion approaches such as the one utilized in the DILE program. The results of two Canadian studies (Lambert & Tucker, 1972; Barik et al., 1977) appear to be supportive of immersion approaches, but as Santiago (cited in Education Week, March 2, 1983) indicated, "The immersion method, which originated in Canada, has only been tried with middle class children." Their relevance for teaching low income Hispanic and Asian students in the U.S. is unclear.

Until recently, little research has been conducted in the U.S. due to Federal policy limiting the use of immersion programs. In 1981 the Joint Dissemination Review Panel of the U.S. Department of Education validated the English imersion Direct Instruction Follow Through program in Uvalde, Texas (Gersten, 1981), an effective approach for teaching mathematics and oral reading to limited and non-English students in the primary grades. Graduates of the Uvalde program consistently score at grade level on standardized achievement tests in mathematics and language expression. Duran (1982) demonstrated that curricular materials developed following the instructional design principles articulated by Becker, Engelmann, Carnine, and Rhine (1981) led to significant faster acquisition of basic mathematical concepts and correct pronunciation of vowels in a beginning reading program than a traditional bilingual program.

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The current evaluation offers further support for the use of structured immersion approaches in the U.S. The Asian students in the primary grade program demonstrated significantly greater growth in Reading and Math than similar students in the district's transitional bilingual education program. Seventy-five percent of the students were above grade level in Reading, 71 percent in Language, and 96 percent in Math.

Like all quasi-experimental evaluation designs, the design is far from ideal. As Cook and Campbell (1979) state, with any quasi-experimental design, replication is essential to rule out alternative explanations of the program's effects. The fact that the pattern of effects was replicated for two cohorts of students supports the idea that the effects were due to the intervention, and not characteristics of the particular students, teachers, or aides involved in the study. One of the most exciting findings was that the program's effects were maintained up to two years after the children completed the program.

Students in the intermediate grades also exhibited significant growth (when compard to the standardization sample) in Reading and Language. One of the two groups also showed significant growth in Math.

There are three components of the program that, in all likelihood, were causes of the growth made by these students: (a) structured immersion involving carefully controlled, but intensive introduction of English into the program, (b) the use of direct instruction/active teaching principles throughout the day, (c) the ungraded learning complex, allowing for older students to be placed in groups based on current skill level, (d) the use of instructional programs for limited-English speaking students that have a history of proven effectiveness with lower income and "at risk" students

(Becker et al., 1981; Stebbins et al., 1977; Guthrie, 1977). An evaluation such as this cannot isolate which component(s) are most related to the impact of the program, but each deserves some consideration as new programs are designed for language minority students.

Structured immersion approaches are clearly worthy of further consideration, and further research. Several programs are currently being instituted in Florida and California. As these programs are developed, designers need to remember that English must be introduced at a level understood by the children. This calls for carefully designed instructional materials using a controlled vocabulary. Program developers should scrutinize those programs that have been effective with English-speaking students entering schools with limited language skills. The results from this project, and the roughly analogous Uvalde, Texas, program would suggest that math instruction is an excellent venue for experimenting with an immersion approach. In mathematics, it is relatively easy to control the vocabulary and to teach math in English while affording language minority students with an opportunity to practice English. Immersion approaches typically report impressive gains in math (Baker & deKanter, 1983).

Tikunoff's (1983) naturalistic research in bilingual classrooms demonstrated that the same cluster of teaching techniques that are effective in elementary classrooms geared towards English-speaking students are effective in classrooms for language minority students. When teachers allocate a good portion of the day to active teaching of reading, math, writing, and language, provides clear and lively demonstrations of concepts and skills, and provide immediate, understandable feedback to children, they learn more. This direct instruction philosophy was at the core of DILE and should serve as a basis for all models of teaching limited English proficient students.

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Author Notes

The author wishes to thank Mary Alice Brockway and Nancy Henares for their conceptual work and support, Judith Arter, W.A.T. White, and Keith Baker for thoughtful feedback on earlier versions of this manuscript; David Fine and Barker Houghton for assistance in the data analyses; and Mardi Klotz for the care with which numerous versions of this manuscript were prepared.

Table 1

Ethnicity of Students in DILE Program:

Grades 3, 4, 5, and 6

Nationality	1980-81	1981-82
Vietnamese	7 (46%)	13 (65%)
Korean	6 (40%)	4 (20%)
Japanese	-	2 (10%)
Laotian	1 (7%)	-
Hispanic	-	1 (5%)
German	1 (7%)	-
TOTAL	15	20

Table 2

Norm-Referenced Comparison: Mean, Standard Deviation, Pre- and Post-Test Scores (in NCE units) on the CTBS (Includes Percentile Equivalents)

1980-81 School Year: Grades 3 to 6 (N=15)

	Pretest (May, 1980)			Post-Test (May, 1981)			Wilcoxon	
	M	SD	%ile[a]	M	SD	%ile	T	t(14)
Total Reading	11.0	17.3	4th	31.2	12.0	19th	110*	6.0*
Total Language	15.2	24.7	5th	34.0	17.1	23rd	113*	5.3*
Total Math	15.8	26.6	13th	47.5	15.2	45th	116*	6.5*

1981-82 School Year (N = 20)

	Pretest (May, 1981)			Post-Test (May, 1982)			Wilcoxon	
	M	SD	%ile	M	SD	%ile	T	t(19)
Total Reading	20.6	23.4	8th	41.1	18.4	34th	205**	6.2*
Total Language	20.4	23.2	8th	41.8	17.4	36th	210**	6.9*
Total Math	39.4	24.8	31st	47.7	20.5	47th	121(NS)	2.9**

[a] Conversion of mean NCE

* Gains from pre to post are statistically significant, $p < .005$

** Gains are significant, $p < .05$

Table 3

Ethnic Distribution for DILE and Comparison Groups for Cohort II

Ethnicity	DILE	Bilingual
Korean	8	2
Vietnamese	2	6
Japanese	2	-
Filipino	2	-
Guam	1	-
Samoan/Thai	1	5
Total	16	7
Entry LAS Scores: Mean	2.18	2.28
SD	1.47	.49

Table 4

Number and Percent of Students

(a) Below, and (b) A+ or Above

Grade Level on CTBS Subtests

Cohort I

	Total Reading		Total Language		Total Math	
	(a) Below	(b) At or Above	(a)	(b)	(a)	(b)
DILE	2 (17%)	10 (83%)	3 (25%)	9 (75%)	1 (8%)	11 (92%)
Bilingual	8 (89%)	1 (11%)	5 (56%)	4 (44%)	3 (33%)	6 (67%)

Cohort II

	Total Reading		Total Language		Total Math	
	(a) Below	(b) At or Above	(a)	(b)	(a)	(b)
DILE	5 (31%)	11 (69%)	5 (31%)	11 (69%)	0 (0%)	16 (100%)
Bilingual	5 (71%)	2 (29%)	4 (57%)	3 (43%)	3 (43%)	4 (57%)

Aggregate (Cohort I and II combined)

	Total Reading		Total Language		Total Math	
	(a) Below	(b) At or Above	(a)	(b)	(a)	(b)
DILE	7 (25%)	21 (75%)	8 (27%)	20 (71%)	1 (4%)	27 (96%)
Bilingual	13 (81%)	3 (19%)	9 (56%)	7 (44%)	6 (38%)	10 (62%)

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Table 5

Followup of all Limited English-speaking DILE Students on the CTBS[a]

Cohort I

(Began in 1978) (N=9)

	End of Second Grade (May, 1980)			End of Third Grade (May, 1981)			End of Fourth Grade (May, 1982)		
	M[a]	SD	%ile	M	SD	%ile	M	SD	%ile
Total Reading	54.8	17.0	60th	55.1	12.3	60th	57.9	13.2	65th
Total Language	58.7	20.2	67th	61.8	16.0	72nd	58.8	9.1	67th
Total Math	71.1	13.9	84th	57.4	8.5	65th	57.9	11.4	65th

Cohort II

(Began in 1979) (N=9)

	End of Second Grade (May, 1981)			End of Third Grade (May, 1982)		
	M	SD	%ile	M	SD	%ile
Total Reading	62.7	12.0	73rd	66.2	15.8	78th
Total Language	63.8	18.7	74th	60.0	23.9	68th
Total Math	67.4	14.5	80th	70.3	18.8	83rd

[a] In NCE units

Table 6

End-of-Second Grade Performance on the CTBS for English-Speaking Students in the Program - Cohort II (N = 10)

	M	SD	%ile
Total Reading	377.7	42.6	79th
Total Language	408.1	60.3	77th
Total Math	346.0	34	81st